Doc.-no.:	AC20/AC30 V1/01/05	**Operating Instructions Ratiomed AC 20/AC 30**	Ratiomed®
Revision:	–		
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Prior to starting up the Ratiomed AC 20/AC 30, read these operating instructions carefully and store them near the unit for later reference!

Mains-operated
Suction Units

CE 0482

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Table of contents

1.0 GENERAL 3

1.1 Standard equipment 3
1.2 Delivery 3
1.3 Explanation of symbols 3
1.4 For your safety – CAUTION! 4
1.5 Application range 5
1.6 Notes on EMC 5
1.7 Warranty 8
1.8 Technical Data 9

2.0 CONNECTION, START-UP AND OPERATION 10

2.1 Functions 10
2.2 Start-up 10
2.3 Operation 11

3.0 CLEANING AND SERVICING 12

3.1 Collection jar: how to evacuate it 12
3.2 Collection jar and housing: how to clean them 12
3.3 Cleaning and disinfection 12
3.4 Filter 13
3.4.1 Filter: general function 13
3.4.2 Filter: how to replace it 13

4.0 TROUBLE-SHOOTING 14

4.1 Fuse: how to replace it 14

5.0 CONSUMABLES, SPARE PARTS AND ACCESSORIES 15

5.1 Consumables 15
5.2 Spare parts 15
5.3 Accessories 16
5.3.1 Accessories: Receptal 16
5.3.2 Accessories: MediVac 16
5.3.3 Accessories: additional 16

6.0 MAINTENANCE AND REPAIR 17

7.0 DISPOSAL 17

8.0 LEGAL INFORMATION 17

9.0 INDEX 18

10.0 FURTHER INFORMATION 20

11.0 DECLARATION OF CONFORMITY 20

The document is subject to technical alterations!

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1.0 GENERAL

These operating instructions apply for following units:

Ratiomed AC 20 ..... REF 8710401
Ratiomed AC 30 ..... REF 8710501

in combination with the accessories mentioned in chapter 5.3 as well as for all identically constructed units with special voltages and special colours respectively.

CAUTION!

The mentioned units are identical with regard to construction and handling. They only differ in their technical data – see chapter 1.8.

1.1 Standard equipment

Ratiomed AC 20/AC 30:

- 2 Collection jars
- Bacterial filter
- 1 Lid S6 with overflow safety
- Silicone hose (6mm internal diameter)
- Finger tip
- Hose connector

1.2 Delivery

The Ratiomed AC 20/AC 30 was subjected to a thorough quality control and carefully packed before shipment. Nevertheless, please immediately compare the contents of the carton with the enclosed delivery note. **In case of transport damages, please immediately contact megro in Wesel or the competent supplier** (addresses on the last page of these operating instructions). Return shipment of the unit (e.g. for repair) should only be effected in an undamaged shipping carton.

1.3 Explanation of symbols

„Caution: pay attention to operating instructions“ acc. to DIN EN 980:2003. This symbol accentuates important information in the operating instructions.

Degree of protection:
Type BF (Body Floating)

Short-time operation

Protection class II

Vacuum low-high
Turn the adjust knob to increase/decrease the vacuum value

1.4 For your safety – CAUTION!

- The safety standard of the Ratiomed AC 20/AC 30 corresponds with recognized medical technical regulations and the **directions of the law relating to medical products**.

- The Ratiomed AC 20/AC 30 has been designed **acc. to EEC Directive 93/42/EEC Annex IX and has been classified as suction unit of Class IIa**.

- The product Ratiomed AC 20/AC 30 bears the **CE identification symbol CE0482** in accordance with the EEC Medical Devices Directive - Directive 93/42/EEC and meets the basic requirements of Annex I to this Directive.

- The **quality management system** used at megro has been certified in accordance with the relevant international standards.

- The Ratiomed AC 20/AC 30 meets the immunity to interference requirements of **IEC 601-1-2/ EN 60601-1-2** „Electromagnetic compatibility - Medical Electrical Devices“. Electromagnetic interference and interaction are thus reduced to a minimum.

- The Ratiomed AC 20/AC 30 may only be applied by persons who have been trained in its operation acc. to the instruction guidelines of megro.

- Prior to connecting the power plug, make sure that the main voltage specified on your unit corresponds with the in building voltage.

- Never connect the unit to defective power sockets. Keep the unit away from external heat sources.

- Check function of the unit prior to use.

- The suction hose must never come into direct contact with the application site. A suction catheter, suction attachment or a medical suction instrument must always be connected to the hose.

- The unit must not be operated without bacterial filter.

- The unit must not be operated in damp rooms, in outdoor ranges or when taking a bath or shower. Avoid moisture on plug and switches. Never plunge the unit into water or other liquids, not even when it is switched off.

- The unit must not be operated in splash water range and in locations where there is a danger of explosion.

- Pay attention to the ambient conditions described in the technical data.

- Only operate the unit in upright position and on a firm, level surface.

- The unit may only be operated under supervision.

- **The unit may not be started**:
  - if cable or plug are defective;
  - if it has been dropped down before;
  - if obvious defects might restrict safe operation;
  - if it has been dropped into water.

  In any case, remove power plug from the mains socket and have the unit checked by qualified personnel authorized by megro.

- In regular intervals, parts of the unit must be checked for proper function and safety-related defects, e.g. plug and socket connections, collection jar, housing etc.

- Opening the unit may only be performed by qualified personnel authorized by megro. Only use original accessories and spare parts.

- The Ratiomed AC 20/AC 30 has been designed for aspirating body fluids in medical ranges. It must never be used to remove explosive gases and inflammable or corrosive fluids.

- Remove power plug from the mains socket:
  - before cleaning and maintaining the unit;
  - before evacuating the collection jar.

- Always pull at the plug, never pull at the cable!

- When operating the unit at ambient temperatures outside the stated temperature range (see technical data), the performance may be reduced.

1.5 Application range

Application ranges of the Ratiomed AC 20/AC 30 are in hospital and medical practice as well as at home.
The Ratiomed AC 20/AC 30 is a mains-operated suction unit for removing secretions, blood and body fluids.
The vacuum can be adjusted using the **regulating valve** and the **vacuum gauge**. The suction hose must never come into direct contact with the application site. A **suction catheter** or an adequate **suction cannula** with or without exhaust air valve must be connected to the hose.

The Ratiomed AC 20/AC 30 **may not be used:**

- for drainages in low vacuum range (e.g. thorax drainage) and for suction procedures outside medical ranges;
- for the suction of inflammable, corrosive or explosive fluids/gases.

In regular intervals, parts of the unit must be checked for proper function and safety-related defects, e.g. plug and socket connections, collection jar, housing etc.

CAUTION!
Disregard of these safety advices may lead to damage to property and persons.

Megro GmbH cannot be held liable for damages to property and persons if this unit is used without observing the instructions in this manual.

1.6 NOTES ON EMC

Medical electrical equipment is subject to special precautions with regard to electromagnetic compatibility and must be installed acc. to following EMC notes.

Portable and mobile HF communication facilities can influence medical electrical equipment.

T201

The Ratiomed AC 20/AC 30 is intended for use in the electromagnetic environment specified below. The customer or user of the Ratiomed AC 20/AC 30 should ensure that it is used in such an environment.		
Emissions Test	**Compliance**	**Electromagnetic Environment - Guidance**
RF Emissions CISPR 11	Class B	The Ratiomed AC 20/AC 30 is suitable for use in all establishments, including domestic, and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonics IEC 61000-3-2	Class A	
Flicker IEC 61000-3-2	Complies	

T202

The Ratiomed AC 20/AC 30 is intended for use in the electromagnetic environment specified below. The customer or user of the Ratiomed AC 20/AC 30 should ensure that it is used in such an environment.			
Immunity Test	**IEC 60601-Test Level**	**Compliance Level**	**Electromagnetic Environment-Guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6kV Contact ±8kV Air	±6kV Contact ±8kV Air	Floors should be wood, concrete, or ceramic tile. If floors are synthetic, the relative humidity should be at least 30%.
Electrical fast transients (EFT)/ bursts IEC 61000-4-4	±2kV Mains ±1kV I/Os	±2kV Mains ±1kV I/Os	Mains power quality should be that of a typical commercial or hospital environment.
Surges IEC 61000-4-5	±1kV Differential ±2kV Common	±1kV Differential ±2kV Common	Mains power quality should be that of a typical commercial or hospital environment.
Voltage Dips/ Dropouts IEC 61000-4-11	<5% U_T (>95% Dip of the U_T) for 0.5 Cycle 40% U_T (60% Dip of the U_T) for 5 Cycles 70% U_T (30% Dip of the U_T) for 25 Cycles <5% U_T (>95% Dip of the U_T) for 5 s	<5% U_T (>95% Dip of the U_T) for 0.5 Cycle 40% U_T (60% Dip of the U_T) for 5 Cycles 70% U_T (30% Dip of the U_T) for 25 Cycles <5% U_T (>95% Dip of the U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Ratiomed AC 20/AC 30 demands continued function even in case of interruptions of the power, it is recommended to supply the Ratiomed AC 20/AC 30 from an uninterruptible current supply or a battery.
Power Frequency 50Hz IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be that of a typical commercial or hospital environment.
NOTE: U_T is the mains alternating current prior to application of the test levels.			

T204

The Ratiomed AC 20/AC 30 is intended for use in the electromagnetic environment specified below. The customer or user of the Ratiomed AC 20/AC 30 should ensure that it is used in such an environment.			
Immunity Test	**IEC 60601- Test Level**	**Compliance Level**	**Electromagnetic Environment - Guidance**
			Portable and mobile communications equipment should be separated from the Ratiomed AC 20/AC 30 incl. the cables by no less than the distances calculated/listed below.
Conducted RF IEC 61000-4-6	3 Veff 150 kHz to 80 MHz	3 Veff	**Recommended distances:** d= 1,2 √ P
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	d= 1,2 √ P for 80 MHz to 800 MHz d= 2,3 √ P for 800 MHz to 2.5 GHz where P is the max. power in watts (W) and d is the recommended separation distance in meters (m). Field strengths from fixed transmitters, as determined by an electromagnetic site[a] survey, should be less than the compliance level[b]. Interference may occur in the vicinity of equipment containing following symbol.

NOTE 1 With 80 MHz and 800 MHz the higher frequency range applies.

NOTE 2 These guidelines may not be applicable in all cases. The propagation of electromagnetic sizes is influenced by absorptions and reflections of buildings, objects and people.

a The field strength of stationary transmitters, such as base stations of cellular phones and mobile terrain radio equipment, amateur radio transmitters, cbm broadcast and TV stations cannot be predestined exactly.
To determine the electromagnetic environment in regard to stationary transmitters, a study of the location is to be considered. If the measured field strength at the location where the Ratiomed AC 20/AC 30 is used exceeds the above compliance level, the Ratiomed AC 20/AC 30 is to be observed to verify the intended use. If abnormal performance characteristics are noted, additional measures might be necessary, e.g. a changed arrangement or another location for the Ratiomed AC 20/AC 30.

b Within the frequency range of 150 kHz to 80 MHz the field strength is to be below 3 V/m.

T206

Recommended separations between portable and mobile RF Communications Equipment and the Ratimed AC 20/AC 30			
The Ratiomed AC 20/AC 30 is intended for use in electromagnetic environment in which radiated disturbances are controlled. The customer or user of the Ratiomed AC 20/AC 30 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF Communications Equipment and the Ratiomed AC 20/AC 30 as recommended below, according to the maximum output power of the communications equipment.			
Nominal output of the transmitter W	**Separation distance, depending on transmit-frequency** **m**		
	150 kHz to 80 MHz d= 1.2 √ P	**80 MHz to 800 MHz** d= 1.2 √ P	**800 MHz to 2.5 GHz** d= 2.3 √ P
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23
For transmitters for which the maximum nominal output isn't indicated in the above table, the recommended separation distance *d* in meters (m) can be determined using the equation belonging to the respective column whereas *P* is the maximum nominal output of the transmitter in watts (W) acc. to manufacturer's specification. NOTE 1 With 80 MHz and 800 MHz the higher frequency range applies. NOTE 2 These guidelines may not be applicable in any case. The propagation of electromagnetic sizes is influenced by absorptions and reflections of buildings, objects and people.			

1.7 Warranty

Megro warrants your new Ratiomed AC 20/AC 30 against defects in material and workmanship during the warranty period of 2 years from the date of purchase. This period is neither extended nor presumed as a result of repairs or replacements carried out. The warranty does not cover accessories, spare parts and consumables.

Megro can be held liable for effects on safety, reliability and performance of the unit only if:

- maintenance and repairs are exclusively carried out by megro or by specialised personnel authorized by megro;
- the product is used properly in accordance to the instructions in these operating instructions.

CAUTION!

Warranty claims will not be accepted if the unit has been opened or repaired by unauthorized individuals or if the unit has not been used in accordance with megro guidelines.

1.8 TECHNICAL DATA

Air-flow rate of pump	Ratiomed AC 20: 18 l/min ± 2 l/min (**low-flow**) Ratiomed AC 30: 28 l/min ± 2 l/min (**high-flow**)
Vacuum	at least -80 kPa (-800 mbar, 600 mmHg) (**high vacuum**) conversion factor: 1 kPa ~ 7.5 mmHg
Collection jar	1 l plastic jar (polypropylene)
Suction hose	silicone, transparent, internal diameter 6 mm, wall thickness 3 mm, length = 1.3 m
Nominal voltage	230 V AC
Mains frequency	50/60 Hz
Power consumption	approx. 80 VA
Current consumption	0.35 A
Dimensions (HxWxD) in mm	290 x 259 + 100 (jar) x 130
Weight (basic unit)	Ratiomed AC 20: 2.9 kg Ratiomed AC 30: 3.5 kg
Operating time	Ratiomed AC 20: continuous operation Ratiomed AC 30: short-time operation, max. 45 min
Degree of protection acc. to IEC 601-1	Type BF
Risk class acc. to 93/42/EEC, IX	IIa (2a)
Protection class acc. to IEC 601-1	II (completely insulated)
Protection classification acc. to IEC 529	IP 20
CE identification	CE0482
Sound emission	w/o vacuum / with vacuum Ratiomed AC 20: approx. 55dB (A) / approx. 56dB (A) Ratiomed AC 30: approx. 57dB (A) / approx. 61dB (A)
Ambient conditions	Transport/storage - 10°C up to + 60°C Operation + 5°C up to + 35°C 5 up to 80% humidity, non-condensing 860 hPa…1060 hPa air pressure
Item numbers	Ratiomed AC 20: REF 8710401 Ratiomed AC 30: REF 8710501

2.0 CONNECTION, START-UP AND OPERATION

2.1 Functions

The Rationed AC 20/AC 30 is a particularly compact suction unit for use in hospital, medical practice and at home. The unit is driven by an electromotive, maintenance-free piston pump. During operation, the pump generates a vacuum in hose system and collection jar; secretions or fluids are thus removed from the body (e.g. by means of a suction catheter). The fluid is collected in the **collection jar**. An **mechanical overflow safety** (on the inner part of the collection jar lid) avoids inadvertent suctioning of fluid into the pump head. The final vacuum and, following, the air-flow rate can be controlled by means of the supplied **finger tip** and the **vacuum fine adjustment**. The vacuum value is shown on the vacuum gauge. A **bacterial filter** avoids penetration of bacteria and sucked fluid into the pump chamber.

2.2 Start-up

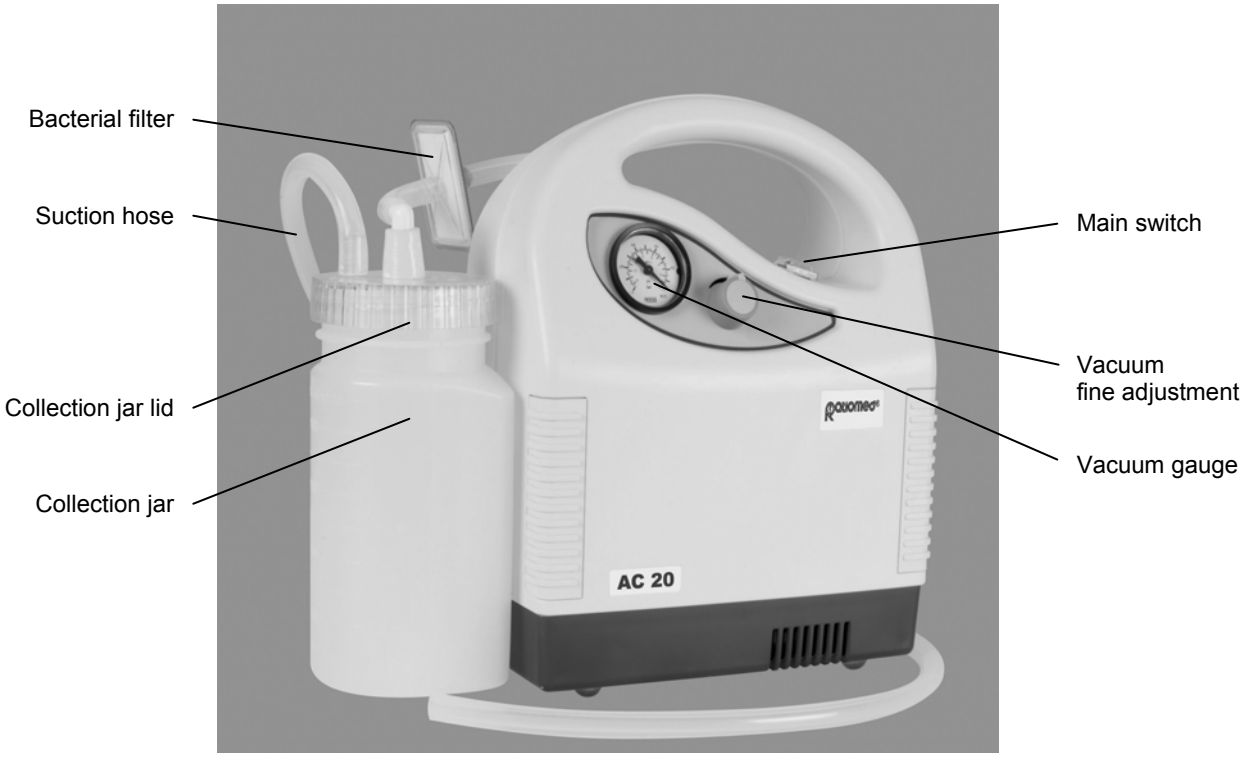
The Ratiomed AC 20/AC 30 is delivered ready for operation. Prior to connecting the power plug, make sure that the **main voltage** specified on your unit corresponds with the in building voltage. First, insert the power cable into the **IEC power socket** on the rear of the unit and then into the **wall socket**. Set **main switch** to 'I'. The green pilot lamp in the switch must flash. Attach **suction hose** to the connection on the collection jar lid (marked with 'patient'). Close the hose with the finger to check whether vacuum is generated.

CAUTION!

The unit may be operated with inserted bacterial filter and in upright position only.

Once the collection jar contains liquid the unit must be placed into upright position. The inserted overflow safety can function in upright position only, no matter whether the unit is being used or not.

Before transporting the unit, make sure that the collection jar lid fits properly.



Ratiomed AC 20 (view of **AC 30** is identical)

2.3 Operation

When the Ratiomed AC 20/AC 30 is used for removing body fluids of all kinds you should follow this procedure:

- depending on the intended application, select a **suction catheter** of the right size or use a suction cannula;
- connect the **suction hose** with the suction catheter by means of a hose connector or directly attach the hose to a suction cannula;
- use the **fine adjustment** to set the **vacuum** and, consequently, the air-flow rate acc. to your requirements. Cannulae with exhaust air valve can be used as additional control possibility.

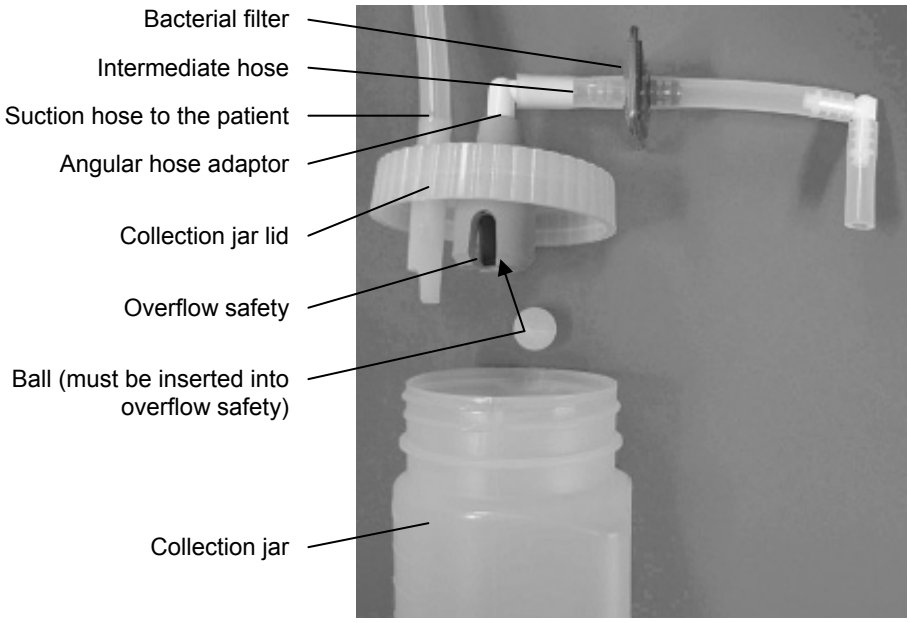
During all suction procedures, always observe the **fill level in the collection jar** (incl. foam). Never overfill the jar. Rinse suction catheter, suction cannula and suction hose with clean water after each suction procedure.

CAUTION!

Make sure that the collection jar is evacuated in time. Generally, it must be evacuated after each finished suction procedure.

When the jar is filled up the overflow safety reacts and the unit stops sucking. In case of extensive foam formation, liquid may reach the filter which will then lose its air permeability and need to be replaced. Evacuate the collection jar.

When secretion has penetrated the pump the Ratiomed AC 20/AC 30 has to be maintained by a service technician authorized by megro.



Collection jar with filter and hose system

3.0 CLEANING AND SERVICING

3.1 Collection jar: how to evacuate it

Switch off the Ratiomed AC 20/AC 30. Remove connecting hoses from the collection jar and withdraw the collection jar incl. lid. Unscrew the lid and evacuate the jar.

CAUTION!

Empty the sucked material in suitable waste water systems only.

3.2 Collection jar and housing: how to clean them

CAUTION!

Prior to cleaning the surfaces, remove power plug from the unit.

Collection jar and collection jar lid can be rinsed under running water or cleaned in an automatic cleaning device.

3.3 Cleaning and disinfection

The unit can be wiped with a moist (not wet) cloth. Basically, all parts which come into contact with secretion must be cleaned and disinfected or sterilized after each suction procedure. Hospital staff may determine other cleaning, disinfecting and sterilizing agents and cycles.
Silicone hoses and collection jar parts (jar and lid) are **autoclave-safe** (20 minutes at max. 121°C). These parts may also be immersed in commercial disinfectants. The hose adaptor (green) may only be cleaned with warm water (up to 50°C).
If, contrary to expectations, the overflow safety does not react and fluid penetrates the intermediate hose and the bacterial filter, then the complete hose set (hose set S6 or S10, see consumables) must be replaced.

CAUTION!

Always comply on principle with the relevant manufacturer's information regarding ingredients, concentrations and application of disinfectants!
The respective notes for use indicated by the manufacturers must absolutely be observed!

3.4 Filter

This suction unit may be operated with bacterial filter only!

CAUTION!

A moist filter reduces the performance of your Ratiomed AC 20/AC 30.
In this case, immediately replace the filter.
Recommendation:
The filter should be replaced every 1-2 weeks.

Please take care that there are always sufficient **spare filters** available (see spare parts list).

Pay attention to maximum fill level in the jar in order to prevent secretion from coming into contact with the filter.

3.4.2 Filter: how to replace it

Removing the filter:

- Remove filter and silicone hose from the attachment on the unit. Take off the hoses and dispose of the filter.

Inserting the filter:

- First, connect the transparent side of the filter to the intermediate hose. Then, attach the blue side of the filter to the filter hose on the pump (see figure in chapter 2.3).

CAUTION!

Important: **The blue side of the filter** must face the unit.

3.4.1 Filter: general function

The original bacterial filter for this unit:

- protects the interior of the unit from contamination;
- stops the flow of liquids due to its hydrophobic features. Together with the mechanical overflow safety this filter prevents sucking in of secretions into the interior of the unit which would cause failure of the Ratiomed AC 20/AC 30.

CAUTION!

Disposable part! The filter must not be cleaned. When the filter is contaminated or moist it must be replaced with a new one.

4.0 TROUBLE-SHOOTING

The Ratiomed AC 20/AC 30 was subjected to a thorough quality control before shipment. If there is, nevertheless, some malfunction, you possibly might solve this problem yourselves if you observe the following instructions.

Problem	Possible causes	Remedy
Unit does not start	– Power plug not inserted	• Check electrical connections
	– Filter is moist (closed)	• Replace filter
	– No mains voltage	• Check fuse and replace, if necessary (see chapter 4.1)
	– Unit got excessively heated up, motor temperature protection was activated	• Let the unit cool down, motor temperature protection will reset automatically
Insufficient performance	– Filter is contaminated	• Replace filter
	– Leakage within the hose system	• Check proper fit of collection jar lid and hose connections
No suction	– Float ball of overflow safety closes the inlet of the collection jar	• Check fill level in collection jar; empty the jar, if necessary
	– Filter is moist (closed)	• Replace filter
	– Suction hose is clogged	• Replace suction hose with filter and connecting hose from filter to unit

4.1 Fuse: how to replace it

To replace the fuse, lift off the cover by means of a small screwdriver.
Replace g-fuse insert with a new one (type: 5x20 mm, 230V, 0.5 A slow-blow, IEC 60127-2/3).

5.0 CONSUMABLES, SPARE PARTS AND ACCESSORIES

CAUTION!
Regularly check your stock for completeness of these parts.

CAUTION!
Operational safety of the unit can be guaranteed by the manufacturer only if original accessories and original spare parts are used.

5.1 Consumables

Bacterial filter (packaging unit = 5 pcs.).....REF 8711100

Float ball for overflow safety (packaging unit = 3 pcs.).....REF 8711104

Silicone suction hose, internal diameter 6mm, length 1.5 m .....REF 8712201

Hose set

Hose set S6
(connection from unit to collection jar and filter, suction hose).....REF 8712107

Hose connector with fingertip

Hose connector S6 without fingertip.....REF 8750502

Hose connector S6 with fingertip.....REF 8750503

5.2 Spare parts

Collection jar, 1.0 l replacement and rinsing jar.....REF 8711105

Lid S6 for collection jar, complete with overflow safety .....REF 8712101

Rinsing bottle.....REF 8711307

Replacement fuse (5x20mm, 230V, 0.5 A slow-blow, IEC 60127-2/3).....REF 8762003

5.3 Accessories

5.3.1 Accessories: Receptal

Unit with
Receptal®-System

Holder with Receptal® canister 1500 ml .....REF 8713100

50 Receptal® disposable liners 1500 ml, with integrated overflow shutoff valve .....REF 8713101

5.3.2 Accessories: MediVac

Holder with MediVac® canister 1000 ml.....REF 8713200

50 MediVac® disposable liners 1000 ml, with integrated overflow shutoff valve .....REF 8713201

Holder with MediVac® canister 1500 ml.....REF 8713300

50 MediVac® disposable liners 1500 ml, with integrated overflow shutoff valve .....REF 8713301

5.3.3 Accessories: additional

Retaining ring

Retaining ring for collection jar, with hose clamp.....REF 8711401

Retaining ring for collection jar, with hose clamp.....REF 8711402
mirror and mirror holder

Unit with
REF 8711403

Retaining ring for collection jar, with hose clamp.....REF 8711403
mirror, mirror holder and special lamp

Spare battery for special lamp.....REF 8711304

Lid S10 for collection jar, complete with overflow safety .....REF 8712102

Unit with trolley

Hose set S10
(connection from unit to collection jar and filter, suction hose).....REF 8712108

Silicone suction hose, internal diameter 10mm, length 1.5m .....REF 8712202

Reduction hose connector S10/6 without fingertip ..... REF 8750512

Reduction hose connector S10/6 with fingertip ..... REF 8750513

Trolley.....REF 8712109

6.0 MAINTENANCE AND REPAIR

The suction unit Ratiomed AC 20/AC 30 may only be opened and repaired by persons explicitly authorized by megro. Technical and hygienic precautionary measures must be observed.

The manufacturer rejects liability for performance of the unit if it has been improperly maintained or repaired using non-original manufacturer parts. **If the unit is opened during warranty period warranty claims will no longer be accepted by megro.**

The cardboard packing can be recycled completely or may be returned to the respective representative in your country.

8.0 LEGAL INFORMATION

Improper handling releases the manufacturer from its warranty obligation. In particular, these operating instructions must be followed.
Liability for products that have been modified from the original, misused or improperly used, is excluded.

Ratiomed is a registered trademark of megro GmbH & Co. KG.

7.0 DISPOSAL

At the end of durability, the components of the Ratiomed AC 20/AC 30 must be disposed of properly, observing the applicable waste-control regulations. In doing so, make sure that the materials are in clean condition and that they are carefully separated.

Parts of the collection jar, hoses and filter may be disposed of as normal waste while the basic unit is disposed of as electric scrap.

The Ratiomed AC 20/AC 30 does not contain any hazardous materials. The housing is marked with a material abbreviation and can be recycled completely.

Pay attention to country-specific regulations for disposal.

12.0 **INDEX** (referenced to pages)

A

accessories 3, 4, 15
address of manufacturer 20
air pressure 8
air-flow rate 10, 11
air-flow rate of pump 8
ambient conditions 4, 8
ambient temperatures 4
application range 5
autoclave-safe 12

B

bacteria 10
bacterial filter 3, 4, 10, 13
body fluids 4, 5, 11

C

CE identification 8
CE identification symbol 4
class IIa 4
cleaning 4, 12
collection jar 3, 4, 5, 8, 10, 11, 12, 14, 15, 16
collection jar lid 10
collection jar, evacuation 12
connection 10
consumables 15
Consumables 15
contamination 13
continuous operation 8
current consumption 8

D

declaration of conformity 9
defects 4, 5, 8
degree of protection 3, 8
delivery 3
delivery note 3
dimensions 8
disinfectants 12
disinfection 12
disposable part 13
disposal 16
durability 16

E

EEC Directive 4
EEC Medical Devices Directive 4
electromagnetic compatibility 4
electromagnetic environment 5, 6, 17
EMC 17
evacuate 11
explanation of symbols 3

F

fill level 11, 13, 14
filter 11, 13, 14, 15, 16
fine adjustment 11
finger tip 3, 10, 15
foam 11
for your safety 4
functions 10
further information 20
fuse 14, 15
fuse replacement 14

G

general 3
g-fuse insert 14

H

hose connector 11
hose set 15
hose system 10, 14
humidity 8
hydrophobic 13

I

IEC 601-1-2/ 4
IEC power socket 10
in building voltage 10
intermediate hose 13
item numbers 8

L

law relating to medical products 4
legal information 16
liability 16

M

main switch 10
mains frequency 8
mains voltage 14
mains-operated 5
maintenance 8, 17

maintenance-free 10
malfunction 14
MediVac 15
moist filter 13

N

nominal voltage 8
non-original manufacturer parts 16
notes on EMC 17

O

operating time 8
operation 4, 10, 11
operational safety 15
original accessories 15
original spare parts 15
overflow safety 3, 10, 11, 13, 14, 15

P

piston pump 10
plastic jar 8
plug 4
power cable 10
power consumption 8
power plug 4, 10, 12, 14
precautionary measures 16
proper function 4, 5
protection class 3, 8
protection classification 8
pump 10
pump chamber 10
pump head 10

Q

qualified personnel 4
quality control 3, 14
quality management system 4

R

Ratiomed guidelines ..... ???
Receptal 15
reducing hose connector 15
registered trademark 16
regulating valve 5
repair 3, 8, 16
retaining ring 15
rinsing bottle 15
risk class 8

S

safety advices 5
secretion 10, 11, 12, 13
service technician 11
servicing 12
shipment 3
short-time operation 3, 8
silicone 8, 13
silicone hose 3
sound emission 8
spare filters 13
spare parts 4, 15
specialiced personnel 8
standard equipment 3
start-up 10
storage 8
suction 4, 5
suction cannula 5, 11
suction catheter 4, 5, 10, 11
suction hose 8, 10, 11, 14, 15
suction procedure 11, 12

T

table of contents 2
technical data 8
transparent 8, 13
transport 8
transport damages 3
trolley 15
trouble-shooting 14
type BF 3, 8

U

upright position 4, 10

V

vacuum 5, 8, 10, 11
vacuum adjustment 3
vacuum fine adjustment 10
vacuum gauge 5, 10
vacuum value 10
voltage 4

W

wall socket 10
warranty 8
warranty claims 8, 16
warranty does not cover 8
warranty obligation 16
warranty period 8, 16
waste-control regulations 16
weight 8

10.0 FURTHER INFORMATION

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11.0 DECLARATION OF CONFORMITY